line 17, change "characteristics are suitable for" to --in at least--.

IN THE DRAWINGS:

Please amend Figures 1 and 2 as shown in red on the attached copy of these figures.

REMARKS

The Office Action of May 23rd, 1991 and the references cited therein have been carefully considered.

In this Amendment the specification has been amended to correct a number of informalities, including providing appropriate headings as requested by the Examiner, and the shifting (with minor formal changes) of the paragraph beginning at the bottom of page 2, and describing Figure 3, to the Detailed Description of the Preferred Embodiment portion of the application, i.e. to page 5. Additionally, a brief description of the prior art Figures 1 and 2 has been inserted. Moreover, the claims have been amended to even more clearly and particularly define the invention and to overcome the formal rejection of same. More particularly, independent claim 1 has been amended to emphasize the essential feature of the invention (as discussed below), claims 2 and 5 have been amended to recite structural features of the invention, claims

3 and 4 have been cancelled and replaced respectively by claims 6 and 7 which likewise recite structural features of the invention, and a new independent method claim 8 directed to a method of operating a continuous wave ranging system as defined in claim 1 has been added in order to define the invention in a different form and scope. Finally, as requested by the Examiner, Figures 1 and 2 have been amended to indicate that they constitute prior art.

In view of the above amendments to the specification and drawings, it is submitted that the objections to same raised by the Examiner have been overcome and should be withdrawn.

The rejection of the dependent claims, i.e. original claims 2-5, under 35 USC 112, fourth paragraph as being of improper dependent form for failing to further limit the subject of the previous claim has been noted. Each of the dependent claims now pending in the application, i.e. original claims 2 and 5, and claims 6 and 7 corresponding to original claims 3 and 4, has been amended to recite structural features which further limit independent claim 1. That is, each of these claims has been amended to specifically state that it is the selector means which performs the stated functions, i.e. structural limitations. Accordingly, reconsideration and withdrawal of this ground of rejection is requested.

Reconsideration of the rejection of all of the claims under 35 USC 103 as being unpatentable over the admitted prior art in view of any one of the Thue '495, Albanese et al '154, Albanese et al '925 or Rittenbach '812 patents, and the rejection of all of the claims under 35 USC 102 as being anticipated by any of the references to Kretschmer, Jr. et al, Krikorian and Zerkowitz, have been noted and are respectfully traversed.

The present invention as defined in claim 1 is directed to a continuous wave ranging system which, in contrast to the prior art system as shown, for example, in Figure 1 of the present application, is provided with a store containing a plurality of <u>different</u> pseudo random codes, and selector means for supplying the modulator and the correlator of the system with <u>a code</u> which is <u>selected from the store and which does not produce a breakthrough side lobe in the next range gate to be tested</u> by the system. It is submitted that none of the references cited by the Examiner teaches, suggests or makes obvious the claimed store or the claimed selector means, and moreover does not teach an appreciation of the problem solved according to the present invention.

Before discussing the actual prior art rejections, it may be helpful to firstly discuss the nature of the so-called side lobes and how they arise which will help in understanding the differences and advantages of the system as claimed in claim 1. The system works basically by correlating or matching a received code with a delayed sample of the code, where the delay is varied so as to correspond to a range of distances of between, e.g., 0 and 10,000 feet. The range is varied stepwise using a series of range gates. The correlator is operative to correlate the received code with the delayed code and to give a large output when these two codes are in phase. The two codes can be considered to cancel one another out when they do not correlate, i.e., are out of phase with one another. Accordingly, one would expect to get a large correlation at delays corresponding to, say, 5 or 10 feet or however far apart the transmitting and receiving antennas are placed, i.e., the so-called "breakthrough" or "spill over" signal. It is fairly easy to filter out that signal because the desired return or reflected signal will usually be occurring at the delays corresponding to much larger distances.

However, because of inadequacies in the code due to the fact that, at the operating speed of the system, the rising and falling voltages of the digital code are not exactly vertical but slope instead, spurious and smaller correlations will occur at delays corresponding to large distances. These originate from the breakthrough signal and are referred to as the "side lobes" of the breakthrough signal. These breakthrough side lobes also would not be a problem if they occurred at delays corresponding to small distances as compared to the distances which it is desired to measure. Unfortunately, these breakthrough side lobes can occur as well within range gates corresponding to any distance, even in the range over which it is desired to measure. However, the Applicants have found that for any given code and for any given arrangement of transmitting and receiving antenna, the breakthrough side lobes occur within predetermined and repeatable range gates. Accordingly, it has been found possible to locate within a store a plurality of different codes and to provide a selector means arranged to select from that store a code which does not produce a breakthrough side lobe within a next range gate to be tested. Each code can be tested empirically to ascertain the position of the breakthrough side lobes and, by selecting an appropriate code as each successive range gate is tested the effects of

breakthrough side lobes can be substantially eliminated. Reference is made in this regard to Figures 4 to 8 of the specification. In Figure 7, sequential range gates are shown going from left to right. It can be seen that only code B (Figure 5) will not produce a breakthrough side lobe until the fifth range gate to be tested. Accordingly, by using code B for the first four range gates in Figure 7, no breakthrough side lobes will be produced. Thereafter, code C will not produce a breakthrough side lobe until the twelfth range gate to be tested and from the twelfth to fifteenth range gate, code A can safely be used without the effect of breakthrough side lobes. The net effect of changing the codes is shown in Figure 8, where it can be seen that only the main and desired correlation peak occurs without problematic breakthrough side lobes.

In rejecting the claims under 35 USC 103 as being unpatentable over the admitted prior art of Figure 1 in view of any of the patents to Thue, Albanese et al '154, Albanese et al '925 and Rittenbach, the Examiner has taken the position that the admitted prior art discloses the present invention with the exception of the memory for storing the codes and the selector means to select the codes; that each of the cited references discloses the use of a storage means in the form of either a memory or register means for the purpose of storing

code sequences; and that consequently it would have been obvious to one of ordinary skill in the art to modify the system shown by Figure 1 of the present invention to include a memory means to store the differing code sequences as taught and as motivated by any of the cited references to arrive at Applicants' claimed invention. This position by the Examiner is respectfully traversed.

Initially, it should be pointed out that none of the references cited by the Examiner teaches, suggests or makes obvious a store containing different pseudo random codes but rather, simply teaches a code generator which can generate different pseudo random codes. Thus, for this reason alone, the combinations suggested by the Examiner would not result in the presently claimed invention. Moreover, and more importantly, none of these references teaches an appreciation of the problem discussed in the present application or gives any clue as to the solution of this problem, i.e. breakthrough side lobes in the various range gates caused by the respective pseudo random codes. Thus, even if, for the sake of argument, one could consider the primary references to contain a "store" or memory storing different pseudo random code sequences, none of the references discloses or makes obvious a "selector means arranged to supply to the modulator and to the correlator a code selected from said store, which selected code does not

produce a breakthrough side lobe within the next range gate to be tested" as now specifically recited in claim 1. Accordingly, it is submitted that for the above stated reasons, claim 1 is clearly allowable over any combination of the admitted prior art (Figure 1 of the present application), and the Thue, Albanese '154 and '925, or Rittenbach references under 35 USC 103.

With regard to the rejection of all of the claims under 35 USC 102 as being anticipated by any of the references to Kretschmer, Jr. et al, Krikorian and Zerkowitz, while these references may teach a radar ranging system wherein the transmitted signal is modulated with a plurality of pseudo random codes and the return signal is correlated with a replica of the modulating code sequence as suggested by the Examiner, none of these references either anticipates nor renders obvious the present invention as defined in claim 1. As indicated above, none of these three references specifically teaches a continuous wave ranging system including a store containing a plurality of different pseudo random codes. However, even if it could be inferred from certain of the references that such a store might be present, clearly none of these references teaches the claimed selector means which supplies both the modulator and the correlator with a pseudo random code selected from the store, and with the selected

code being one which does not produce a breakthrough side lobe within a next range gate to be tested, all as required by claim 1. In fact, none of these references appears to teach any "selector means" at all which supplies both the correlator and the modulator with a code selected from a store. Accordingly, for the above stated reasons, it is submitted that claim 1 is allowable over each of the references to Kretschmer, Jr. et al, Krikorian and Zerkowitz under 35 USC 102(a) or (e).

Claims 2, 5, 6 and 7 are each dependent on claim 1 and accordingly are allowable over the cited prior art for at least the same reasons as that claim. It should be noted that each of these claims more specifically sets forth specific additional functions of the "selector means" which features, in the claimed combination, are clearly not taught, suggested or made obvious by any of the cited references.

Newly presented independent method claim 8 recites a method of operating a continuous wave ranging system of the type defined in claim 1 including the steps of ascertaining the range gates within which each respective stored pseudo random code will produce a breakthrough side lobe, and causing the selector means to select from the store only a code which does not produce a breakthrough side lobe within a next range gate to be tested. Clearly, none of the cited references

either teaches, suggests or makes obvious these claimed steps of method for operating the continuous wave ranging system as defined in claim 8. Accordingly, it is submitted that claim 8 is likewise allowable over any combination of the cited prior art.

In view of the above amendments, and for the above stated reasons, it is submitted that each of the claims now pending in this application, i.e. claims 1, 2 and 5-8, is allowable over the prior art of record and is in condition for allowance. Such action and the issuance of the Notice of Allowability (Form D-10) by the Examiner are therefore respectfully requested.

If the Examiner believes that a conference would be of value in expediting the prosecution of this application, the Examiner is hereby invited to telephone undersigned counsel to arrange for such a conference.

Respectfully submitted,

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